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To cite this article: Kevin Moran, Jonathon Webber & Teresa Stanley (2016): The 4Rs of Aquatic Rescue: educating the public about safety and risks of bystander rescue, International Journal of Injury Control and Safety Promotion, DOI: [10.1080/17457300.2016.1224904](https://doi.org/10.1080/17457300.2016.1224904)

To link to this article: <http://dx.doi.org/10.1080/17457300.2016.1224904>



Published online: 16 Sep 2016.



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## The 4Rs of Aquatic Rescue: educating the public about safety and risks of bystander rescue

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(Received 3 April 2016; accepted 5 August 2016)

From 1980 to 2014, 87 persons drowned in New Zealand while attempting to rescue others; all incidents occurred in open water and most (80%) fatalities were male. While bystander rescue has been promoted as a way of preventing drowning, little is known about the knowledge base that informs potential rescuers. This study utilized a family water safety programme to promote a resource entitled the *4Rs of Aquatic Rescue*. Participants ( $n = 174$ ) completed a pre-intervention survey and were then provided with information and access to electronic resources on safe bystander rescue techniques. Most respondents (71%) had never been taught rescue techniques, and males were more confident of their rescue ability. Upon completion of the programme, significant differences were evident in respondents' understanding of rescue safety, but this did not translate to greater confidence or disposition towards performing a rescue. Ways of promoting bystander safety around water are discussed and recommendations for future studies are made.

**Keywords:** rescuer drowning; aquatic-victim-instead-of-rescuer (AVIR) syndrome; multiple drowning incidents; water safety education; rescue competency; drowning prevention

### Introduction

A recent comparative analysis of drowning incidents in 60 countries reported that falling into open water accounted for almost half (43%) of fatalities in New Zealand, and one-third (33%) of fatalities in Australia (Lin, Wang, Lu, & Kawach, 2014). While most open water drowning events are preventable, many require the intervention of others and, in some circumstances, the consequences of such intervention can itself result in loss of human life (Moran & Stanley, 2013). From 1980 to 2014, 87 persons drowned in New Zealand while attempting to rescue others (Water Safety New Zealand [WSNZ], 2014). Of these, most (80%) were male; Maori (33%) and Pasifika (12%) people were over-represented. All rescue fatalities occurred in open waters with beaches (54%) and rivers (22%) being the most frequent sites of drowning. Rescuer fatalities are often dramatically reported by the media, especially where the rescue of children or members of a family are concerned (for example, *Bay of Plenty Times*, 2014; *Sunday Star Times*, 2014). In spite of a high media and public profile, until recently, research studies on the phenomenon have been lacking.

One study found that bystanders' actions can make a critical difference in preventing loss of life, but rescuer safety is a foremost consideration (Venema, Groothoff, & Bierens, 2010). A recent Queensland study reported that one-quarter (24%) of survey respondents had undertaken

a rescue at some time of their life, 42% of victims were not known to the rescuer, and the mean age of victims was 15 years. (Franklin, King, & Leggat, 2015). Other studies have found that rescuer drowning incidents often involve more than one victim (Franklin & Pearn, 2010; Turgut & Turgut, 2012). The loss of rescuer life in drowning emergencies has been described by Franklin and Pearn (2011) as the aquatic-victim-instead-of-rescuer (AVIR) syndrome, and in many developed countries, it is a persistent cause of drowning mortality. Recently, some attempt has been made to analyse the underlying motivations of the rescuer who drowns (Pearn & Franklin, 2012), but little is known about what skills and knowledge the rescuer possessed that may have prevented their drowning. One study has found that more than half of fit adults tested in a simulated drowning incident on dry land could not throw a rope accurately (Pearn & Franklin, 2009).

New Zealand studies have identified a lack of lifesaving training. A nationwide water safety survey of New Zealand youth found that one-third (35%) considered that they had no rescue ability, and more than half (59%) expressed doubts about their ability to perform a deep-water rescue (Moran, 2008a). A lack of rescue ability has also been reported among 21-year-old Dunedin young adults, most of whom (52%) had not received any lifesaving training (Gulliver & Begg, 2005). In a study of parents/caregivers ( $N = 769$ ) in charge of children under

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10 years of age at 18 New Zealand beaches during the summer of 2007, more than three-quarters (76%) of parents surveyed had not received any rescue/lifesaving training (Moran, 2009). Importantly, male beachgoers were more confident of their ability to rescue their child even though they reported no more lifesaving training than the females that took part in the study. Festivalgoers ( $N = 415$ ) attending a cultural event in Auckland, took part in a water safety survey that included information on their readiness to respond in a drowning emergency (Moran & Stanley, 2013). Many indicated they would jump in and rescue a victim (47%), while less than one-third (30%) would get flotation to the victim. Most (62%) estimated that they could only swim less than 100 m; 85% reported having swum that distance in a swimming pool rather than in open water where most rescues take place.

While the risk factors associated with bystander rescue are now well known and reported, it is unlikely that altruistically motivated rescuers will resist impulsive attempts to rescue a drowning person (Pearn & Franklin, 2012). Bystanders are recognized as a potentially valuable contributor to drowning prevention in the World Health Organisation (WHO) Global Report on Drowning that identifies 10 key actions to prevent drowning – the fourth of which is to train bystanders in safe rescue and resuscitation (WHO, 2014). Educating people about how to respond without endangering their own life has become the focus of attention, and the promotion of non-contact rescue techniques in lifesaving literature is now the norm (for example, Royal Life Saving Australia [RLSSA], 2006, 2012). In New Zealand, rescue skills have traditionally been taught within the swimming and lifesaving component of the physical education syllabus (Department of Education, 1987), however, evidence of how well informed or equipped members of the public are to engage in rescue activity is currently lacking.

It is the purpose of this study to evaluate a new resource entitled the *4Rs of Aquatic Rescue* by measuring the uptake of rescue information and emergency procedures among members of the public exposed to it. In addition, it will ascertain the prior knowledge and understanding of bystander rescue, the formal training in rescue skills and procedures, and the levels of confidence of participants to engage in emergency rescue activity.

## Method

### Programme development

The *4Rs of Aquatic Rescue* resource was developed in response to unusually high rescuer drowning fatalities during the previous summer season (November 2014–March 2015) and raised public concern about the dramatic and tragic loss of life. The development of a mnemonic entitled the *4Rs: Recognise, Respond, Rescue, Revive*, and the advice proffered in conjunction within these steps of bystander rescue were based on longstanding lifesaving advice, such as the Shout-Reach-Throw-Row-Go-Tow (Royal Life Saving Society Canada, 1972), and Check-Talk-Reach-Throw-Wade-Row (RLSSA, 2012). The sequencing of steps in the *4Rs* was predicated on a recently proposed *Drowning Chain of Survival* designed to inform lay and professional rescuers (Szpilman et al., 2014).

The pictogram (Figure 1) illustrates critical components of the survival chain upon which the *4Rs* have been developed. They specifically include the recognition of distress (the first R – Recognise), the provision of flotation in the immediate response phase (the second R – Respond), the removal from water by rescue (the third R – Rescue) and the final phase of provision of post-rescue care (the fourth R – Revive). Each of the critical phases was populated with simple advice as to what to do based on safety of self and others (including the victim).

Resources developed to promote the *4Rs* included: 5000 pamphlets for public distribution (WaterSafe Auckland Inc. [WAI], 2015a), a website page with downloadable resources and a video link to a practical demonstration on how to apply the *4Rs* (WAI, 2015b). This information was also available via social media (Facebook and YouTube) and promoted in newspaper releases (for example, *New Zealand Herald*, 2013, 2014) prior to the commencement of the study. Participants were given copy of the pamphlet and the video link to the practical demonstration after they had completed the initial survey.

### Study design

The study design chosen for this study was a repeated measures (test–retest) experimental design. The setting



Figure 1. Pictogram of the new Drowning Chain of Survival (Szpilman et al., 2014).

for the study was 20 swimming pools in metropolitan Auckland, and data gathering took place over the summer months (October–January 2016) during free water safety lessons aimed at parents ( $n = 467$ ) and their children aged 9 months–8 years ( $n = 790$ ). Entitled Whanau Nui (Maori term meaning Family Way), the programme was developed and organized by WaterSafe Auckland Inc. for parents/caregivers and their children. The emphasis in the intensive five 30-minute sessions was teaching water safety and water competence rather than the traditional ‘Learn-to-swim’ focus. Topics covered in the programme include lifejacket use, flotation, safe entries and exits, supervision and safe bystander rescue. The inclusion of the latter component provided the opportunity to assess the value of the *4Rs of Aquatic Rescue* promotion and is the focus of the present study.

### Participants and procedures

Participants were a group of parents/caregivers ( $n = 467$ ) whose children were enrolled in water safety lessons at eight Auckland swim schools. Parents/caregivers were given copy of the new resources and invited to take part in a pre- and post-programme survey that sought information on their level of understanding and perceptions of rescue competency. The self-completed written questionnaire was given out prior to the distribution of the *4Rs of Aquatic Rescue* resources and the commencement of the in-water sessions with their children. Participants were asked to complete a follow-up survey upon completion of the water safety programme.

### Research instruments

The self-completed questionnaires consisted of 18 questions and were designed to be completed in 10–15 minutes. The questionnaires sought information on socio-demographic characteristics (including age, sex, length of residence and ethnicity). Self-estimates of swimming competency included the use of a 4-point scale of *very good*, *good*, *fair* and *poor*, an estimate of how far they could swim nonstop, and whether they had swum the estimated distance in open water. They also included questions on any previous lifesaving (not lifeguard) and cardiopulmonary resuscitation (CPR) instruction, and any personal recall/experience of rescue from drowning. Using a 0–100 scale, participants were asked to subjectively estimate their ability to perform a rescue, their willingness to perform a rescue on someone they knew, and on a stranger. Participants were also asked to express their levels of confidence in responding to an emergency incident where risk of drowning was present using a 4-point scale from *extremely confident* to *extremely anxious*.

Two questions sought information on participant’s knowledge and understanding of rescue techniques and

procedures. The first asked for true/false responses to series of eight statements about rescue procedures (for example, *If you think someone is in trouble in the water shout ‘Are you okay?’*). The second required participants to correctly order the steps recommended in performing a rescue (for example, first R – *Recognise*) and linking the step to the correct safety message (for example, *Look for signs of distress*). The only difference in the pre- and post-intervention surveys was the final question in each survey. The final question in pre-intervention survey sought information on respondents’ perceptions of risk of drowning using a 5-point Likert type scale from *strongly agree* to *strongly disagree* based on previous water safety surveys of beachgoers (McCool, Moran, Ameratunga, & Robinson, 2008) and rock-based fishers (Moran, 2008b). The final question in the post-intervention survey was similarly structured, but focussed specifically on attitudes to bystander rescue.

### Data analysis

All pre- and post-intervention data were entered into SPSS (Version 23, Armonk, NY, USA) for statistical analysis. Frequency tables using numbers and percentages were generated to report on respondent’s self-estimated swimming and rescue competencies, previous training and perceptions of rescue protocols and practice. Because the pre- and post-interventions surveys were not matched, the data were treated as two independent samples. Measures of central tendency used to measure continuous data (such as the 0–100 scales) included means, medians and standard deviation with independent samples *T*-tests to measure levels of significance between pre- and post-intervention responses. For binary data, chi-square tests were used to ascertain the associations among dependent variables (such as rescue knowledge and self-reported competencies) and independent variables (such as sex, age and ethnicity).

### Results

Of the 467 adults enrolled in a parent and child water safety programme conducted in the summer of 2015–2016, 174 adults agreed to take part in the pre-entry survey, a response rate of 37%. Of these, most were female (77%) and aged between 30 and 44 years (67%). One-third of the respondents (33%) had lived in New Zealand for less than 10 years. In terms of ethnicity, the sample approximated proportions reported in the 2013 Census data (Auckland Council, 2014) for the Auckland region with 50% of the sample self-identifying as European, 18% as Maori, 12% Pacific Island people, 17% Asian and 2% as being from ‘other’ ethnic groups. When asked about their swimming competency, most reported that they could swim (87%), and of these, most considered themselves to be *good/very good* swimmers (64%);

although when asked how far they could swim, only half (50%) thought they could up to 25 m. Less than half (49%) reported having swum that distance in open water, and of these, 40% had done so in the previous year.

### ***Pre-intervention knowledge of bystander rescue***

Table 1 shows responses to questions on any rescue and CPR instruction they had received prior to the onset of the water safety programme. Most respondents (71%) had never been taught rescue techniques. Of those who had received instruction, schools were the most frequent site of learning (47%) and most (78%) had received instruction more than 10 years ago. When analysed by gender or age, no significant differences were evident in prior rescue training. Significant differences were evident in the extent of lifesaving instruction when analysed by ethnicity and length of residency. Fewer Asian (9%) than non-Asian respondents (35%) had received rescue training ( $\chi^2 = 16.482$  (1),  $p = <0.001$ ) and fewer short-term residents (<10 years, 17%) than long-term residents (>10 years, 36%) reported having had rescue instruction ( $\chi^2 = 11.672$  (1),  $p = 0.001$ ).

Table 1. Lifesaving and CPR instruction and confidence prior to programme commencement ( $N = 174$ ).

		N	%
Lifesaving instruction?	Yes	50	29%
	No	124	71%
If yes, ( $n = 50$ ) when?	0–4 years	4	8%
	5–9 years	7	14%
	10 years+	39	78%
Where?	School	24	47%
	Club	18	35%
	Family/friends	4	8%
	Self-taught	5	10%
How do you feel about rescuing someone in open water?	Very confident	8	5%
	Confident	53	31%
	Anxious	77	44%
CPR instruction?	Yes	119	68%
	No	55	32%
If yes, ( $n = 119$ ) where?	School	9	8%
	Club	13	11%
	Family/friends	11	9%
	First aid course	86	72%
If yes, ( $n = 119$ ) when?	In the last year	32	27%
	In the last 5 years	45	38%
	In the last 10 years	19	16%
	> 10 years	24	20%
	Total	174	100%

When asked what would be their immediate response to seeing someone in difficulty in the water, one-quarter (26%) gave the correct response of getting flotation to them, but more than one-quarter (29%) responded that they would jump in and rescue the victim. When asked about their experience of rescue, 36% knew someone who had been rescued, one-third (33%) had seen someone being rescued and a small proportion had rescued someone (6%) or had been rescued themselves (3%). One-third of respondents (35%) were confident of their ability to safely rescue someone in open water. Most (68%) had received CPR training, and two-thirds (65%) had received this training in the past five years.

When analysed by sex, significantly more males (68%) than females (25%) had confidence in their ability to rescue someone in trouble ( $\chi^2 = 48.580$  (3),  $p = <0.001$ ). Females were three times more likely than males to be 'very anxious' about their ability to perform a rescue (females 26%, males 8%). No significant differences were found when rescue confidence and CPR training were analysed by age, but when analysed by ethnicity, significantly fewer Asian (17%) than non-Asian respondents (40%) expressed confidence in their ability to perform a rescue ( $\chi^2 = 19.641$  (3),  $p = <0.001$ ). Significantly fewer Asian (55%) than non-Asian respondents (74%) had received CPR instruction ( $\chi^2 = 8.242$  (3),  $p = 0.004$ ). When analysed by length of residency (<10 years, >10 years), significantly more respondents of recent residency (73%) than long-term residents (61%) were *anxious/very anxious* about their rescue competence ( $\chi^2 = 14.196$  (3),  $p = 0.003$ ).

When asked to indicate on a percentage scale their ability to rescue someone in trouble in open water (prior to receiving instruction on safe rescue techniques and procedures), the mean score was 37%. Respondents were also asked to indicate their willingness to rescue someone they knew and someone they did not know using a percentage scale. In the pre-intervention survey, a mean score of 73% was reported for participant's willingness to rescue someone they knew, but proportionally, fewer respondents indicated a willingness to rescue someone they did not know (62%). No significant differences were found in willingness to rescue someone they knew or rescue a stranger when analysed by sex, age, ethnicity or length of residency.

### ***Post-intervention changes in bystander rescue knowledge***

Upon completion of the five day in-water programme, parents/caregivers repeated the survey to determine what effect the intervention had on their knowledge of, and attitudes towards bystander rescue. No significant differences were found in the socio-demographic data of respondents who took part in the initial ( $n = 174$ ) and the

Table 2. Correct responses to rescue safety knowledge pre-intervention ( $N = 174$ ) and post-intervention ( $N = 143$ ).

	Answer (✓/x)	Pre- intervention n/%	Post- intervention n/%	$\chi^2$	$p$
If you think someone is in trouble in the water, shout 'Are you okay?'	✓	113 65%	111 78%	8.962	0.011*
Waving arms and shouting for help are normal signs of someone drowning	×	40 23%	48 34%	5.570	0.062
The victim's safety is the key concern in attempting any water rescue	×	54 31%	74 52%	14.583	.001*
Seconds count, swim towards a drowning person as soon as possible	×	23 13%	48 34%	19.069	<0.001*
Always take flotation if you have to go in the water to perform a rescue	✓	122 70%	125 88%	17.610	<0.001*
The correct compression to ventilation ratio for CPR is 30:2	✓	65 37%	83 59%	16.558	<0.001*
If a person is feeling okay after being rescued they do not need medical help	×	95 55%	121 85%	37.257	<0.001*
If conscious, get the rescued person mobile as soon as possible to warm them up	×	38 22%	61 43%	16.336	<0.001*

\*Statistically significant difference.

post-intervention survey ( $n = 142$ ). Table 2 shows the changes in the proportion of correct responses to eight statements related to bystander rescue knowledge. Significant differences in the number of correct responses were evident in all but one of the statements post-intervention, that one being the statement regarding the waving of arms in a drowning victim. Most respondents incorrectly thought that the waving of arms was a characteristic of a drowning person both pre- (incorrect response 72%) and post-intervention (incorrect response 60%).

No significant differences were evident when bystander rescue knowledge was analysed by gender or age group in either the pre-intervention or post-intervention surveys. No significant differences were evident when rescue knowledge was analysed in the post-intervention survey by ethnicity and length of residency, except in the response to the statement on victim safety being the primary concern. Significantly fewer Asian (24%) than non-Asian (60%) participants correctly responded to the statement concerning the primacy of their safety in a rescue situation ( $\chi^2 = 14.552$  (2),  $p = 0.001$ ), and fewer recent residents (41%) than long-term residents (59%) also thought the victim's safety of greater concern than their own ( $\chi^2 = 8.869$  (2),  $p = 0.038$ ).

Table 3 shows the pre- and post-intervention differences in recall of the correct sequence of the 4Rs order and their related key point. Significant improvements are evident in each of the tasks with most respondents able to recall the correct order of events (range 80%–86%), and most were able to relate the correct key point to each phase of the rescue (range 57%–69%).

No significant differences were found in the correct recall of the phases and their related key point when analysed by gender, age group, ethnicity or length of residency.

#### Post-intervention perceptions of bystander rescue

Table 4 shows participants' beliefs about their capacity to safely rescue someone in trouble in the water at the end of a water safety programme that provided information about safe bystander rescue techniques. One-half of respondents (51%) considered they had sufficient knowledge but many (56%) thought that they would be too afraid to help irrespective of who was in the water. Only one-quarter (25%) considered their swimming ability enough to prevent their drowning, and most (60%) were still unsure of any protective effect of their swimming ability in a rescue situation. In addition, most thought that others with better

Table 3. Correct responses to order of 4Rs and related response pre-intervention ( $N = 174$ ) and post-intervention ( $N = 143$ ).

	Pre-intervention n/%	Post-intervention n/%	$\chi^2$	$p$
Recognise	69 40%	119 84%	63.295	<0.001*
Look for signs of distress	48 28%	97 69%	52.604	<0.001*
Respond	61 35%	113 80%	62.651	<0.001*
Provide flotation	27 16%	91 64%	79.565	<0.001*
Rescue	62 36%	117 82%	69.659	<0.001*
Stay clear of the person	15 9%	91 57%	90.074	<0.001*
Revive	73 42%	122 86%	64.174	<0.001*
Wait for help to arrive	26 15%	91 64%	82.760	<0.001*

\*Statistically significant difference.

Table 4. Perceptions of rescue competency post-intervention ( $N = 143$ ).

	Agree/strongly agree	Disagree/strongly disagree	Unsure/nil response
I have sufficient rescue knowledge to save someone else	84 59%	54 38%	5 4%
Better to risk your own life than watch someone drown	33 23%	105 73%	5 4%
My lack of swimming ability means I would probably drown trying to rescue someone	72 50%	66 46%	5 4%
I would ask others to rescue someone and tell them how to do it safely	68 48%	70 49%	5 4%
I would be too afraid to help irrespective of who it was in the water	22 15%	116 81%	5 4%
I would only be able to respond if it were family in trouble	34 24%	104 73%	5 4%
I would jump in to help in a pool but not in open water	57 40%	81 57%	5 4%
I would jump in to help only if I was supervising the person	27 19%	111 78%	5 4%
It is not my responsibility to rescue other people	16 11%	122 85%	5 4%
Better swimmers than me should do the rescue	96 67%	42 29%	5 4%

swimming ability should perform a rescue (61%), and one-half (52%) thought rescue was the responsibility of others.

When post-intervention rescue attitudes were analysed by gender, significant differences were found in responses to three of the eight statements. Significantly more males than females (males 74%, females 53%) considered they had sufficient rescue knowledge ( $\chi^2 = 6.860$  (2),  $p = 0.032$ ), more males (males 77%, females 49%) were willing to perform rescue in open water ( $\chi^2 = 10.761$  (2),  $p = 0.005$ ) and more males (males 49%, females 22%) disagreed that better swimmers should perform a rescue ( $\chi^2 = 10.758$  (2),  $p = 0.005$ ).

No significant differences were evident in post-intervention perceptions of rescue when analysed by age group or length of residency. When analysed by ethnicity, significantly fewer Asian (35%) than non-Asian respondents (65%) considered they had sufficient rescue knowledge ( $\chi^2 = 9.336$  (2),  $p = 0.009$ ), and significantly more (Asian 79%, non-Asian 43%) thought their lack of swimming ability would result in their drowning ( $\chi^2 = 12.649$  (2),  $p = 0.002$ ). In addition, more Asian (79%) than non-Asian (43%) thought that they would be too afraid to rescue someone irrespective of who it was in trouble ( $\chi^2 = 6.883$  (2),  $p = 0.032$ ).

### *Changes in self-estimated rescue ability, willingness to perform a rescue*

*T*-test analysis of self-estimated percentage rating of rescue ability and willingness to perform a rescue on a known and unknown victim suggest that the acquisition of knowledge on how to safely perform a rescue did not significantly change confidence in would-be rescuers' ability or their disposition towards rescuing known and unknown victims (Table 5).

When analysed by gender, significant differences ( $t = 3.399$ ,  $p = 0.001$ ) were evident in the post-intervention mean scores of self-estimated rescue ability, with males estimating greater rescue ability (males mean estimate 53%, females mean estimate 37%), but no gender differences were evident on willingness to rescue someone known or unknown. When analysed by ethnicity, significant differences ( $t = 2.785$ ,  $p = 0.006$ ) were evident in the mean scores of Asian (mean estimate 29%) and non-Asian respondents (mean estimate 44%), but no differences were evident on willingness to rescue someone known or unknown. No differences in self-estimated rescue ability post-intervention were evident when mean scores were analysed by age group or length of residency.

Table 5. Changes in mean percentage ratings of self-estimated rescue ability, willingness to perform a rescue pre-intervention ( $N = 174$ ) and post-intervention ( $N = 143$ ).

		<i>m</i>	Standard deviation (SD)	Median	Mean diff.	<i>t</i>	<i>p</i>
Rescue ability	Pre-intervention	37.2%	26.771	30	-3.371	-1.106	0.269
	Post-intervention	40.6%	27.056	45			
Willingness to rescue someone you know	Pre-intervention	73.1%	30.701	90	-2.188	-0.669	0.504
	Post-intervention	75.2%	26.554	85			
Willingness to rescue someone you do not know	Pre-intervention	62.3%	31.754	70	-1.260	-0.351	0.726
	Post-intervention	63.6%	31.744	70			

## Discussion

This study examined the knowledge and perceptions of bystander rescue among participants in a family water safety programme that included safe rescue information called the *4Rs of Aquatic Rescue* as part of its content. As well as providing evaluation of the safe rescue programme, the results provide new information on what members of the public know, and how they feel about helping others in a drowning-related emergency.

### *Profile of a bystander rescuer*

Results from the pre-intervention phase of this study suggest that many people are not well prepared for an open water rescue, irrespective of how rare or commonplace they might be. When asked about their swimming competency, most participants (87%) reported that they could swim and, of these, two-thirds (64%) considered themselves to be good swimmers, yet one-half (50%) could only swim up to 2 m – a capacity unlikely to offer much protection from the risk of drowning as has been previously reported (Stanley & Moran, *in press*), and even less likely given the demands of an open water rescue emergency. To compound the risk, half (51%) of the respondents had not swum their estimated swimming distance in open water and, of these, less than half (40%) had done that in the previous year. On the basis of this self-reported swimming competence, it would appear that many would-be rescuers do not possess the necessary swimming base to safely perform an open water rescue, and this alone may explain why some rescuers drown.

In terms of previous lifesaving training, most participants (71%) had not received any formal instruction and, of those who had, more than three-quarters (78%) had received that instruction more than a decade ago. It is not surprising therefore that most (65%) felt anxious about rescuing someone in trouble in the water, with females and Asian respondents especially more likely to be anxious about their rescue capability. A similar lack of bystander emergency skills (such as CPR) among new residents has been previously reported in adults (Moran & Willcox, 2013), Asian youth (Moran, 2006) and Pasifika youth (Moran, 2007). Given the lack of rescuer safety education via schooling and public education in general and for some population groups with no formal water safety education (such as new settlers and Asian peoples) in particular, targeted interventions in schools and public water safety campaigns are recommended.

When asked about their rescue knowledge, levels of understanding varied considerably (see Table 3). While two-thirds of the respondents correctly agreed for the need to shout ‘Are you okay?’ to the person in the water, less than a quarter (23%) correctly disagreed that waving arms and shouting for help were normal signs of someone

drowning. Alarming, only 13% disagreed with the statement that you should swim towards the drowning person as soon as possible, and most (63%) agreed that the drowning victim’s safety was the key concern. When asked about the order of rescue phases and related key points (see Table 4), the poor proportions of correct responses (range 9%–42%) also suggests a lack of understanding. Perhaps of greatest concern was the finding in the pre-intervention survey that very few respondents (9%) identified the need to stay clear of the victim in the rescue phase, a standard mantra in lifeguard training and lifesaving instruction. When asked what they would do if they saw someone in trouble in the water, only one-quarter (26%) of participants gave the correct response of immediately getting flotation to a victim, and more than one-quarter (29%) gave the most dangerous response that they would immediately dive in and rescue the person, a better response to that previously reported where almost half (47%) would dive in as an immediate response (Moran & Stanley, 2013).

Males were more confident than females (males 68%, females 25%) even though no significant differences were evident in the training they had received or knowledge they possessed prior to the water safety programme. Whether this confidence is well founded requires further investigation but, as has been reported in other studies, the tendency for males to overestimate their abilities appears likely (Howland, Hingson, Mangione, Bell, & Bak, 1996; McCool, Moran, Ameratunga, & Robinson, 2008; Moran & Stanley, 2013; Stanley & Moran, *in press*).

### *Effect of the 4Rs of Aquatic Rescue intervention*

Analysis of the post-intervention surveys suggests that knowledge of safe bystander rescue techniques and protocols improved as a consequence of participation in the water safety programme. A significant increase in the correct responses to all but one of the rescue knowledge statements in the post-intervention survey is encouraging (Table 3). The persistence of the misconception that drowning people wave their arms and shout for help suggests that this is a strongly held belief that was not corrected by the intervention. Further emphasis on this critical factor of victim identification is strongly recommended in future bystander water safety programmes. While positive change pre- and post-intervention was evident on dissuading would-be rescuers from immediately diving into the water, most still considered this the correct action; similarly strong emphasis should also be placed on water entry as the last, not first resort in a drowning emergency. Perhaps the most encouraging shift in understanding relates to the necessity to take flotation with them if forced to enter the water, with most of all respondents aware of this crucial message after the programme (pre- 70%, post- 88%).



When questioned about the correct sequence of responses and related actions, the increased awareness of the *4Rs of Aquatic Rescue* post-intervention was also encouraging. Table 4 shows that significantly more participants were able to recall the correct order of events and identify the associated key safety point after the water safety sessions, although in the *Rescue* phase of the sequence, only slightly more than half (57%) recognized the need to stay clear of the person in trouble during an in-water rescue situation. Further reinforcement on the safety of self and the need to keep clear of the victim is strongly recommended.

In the final survey, participants were asked whether their perceptions of being a potential bystander rescuer had changed as a consequence of the programme. While respondents appeared better informed about rescue safety knowledge, the findings reported in Tables 4 and 5 suggest that this did not translate into increased confidence in their ability to perform a rescue. No significant differences were evident upon completion of the programme in their estimated ability to perform a rescue (mean % estimate pre- 37%, post- 41%). In addition, their willingness to rescue someone they either knew (mean % estimate pre- 73%, post- 75%) or a stranger (mean % estimate pre- 62%, post- 63%) did not increase significantly. When analysed by gender, males estimated greater rescue ability than females on the percentage rating scale post-intervention (males 53%, females 37%), although no significant differences were evident in their willingness to perform a rescue either on someone they knew or on a stranger. This suggests that factors other than knowledge of safe rescue techniques may influence decisions on bystander participation. Pearn and Franklin (2012) have suggested that senses of duty, supererogation and altruism may be significant motivators in a life threatening situation, but conclude that equipping would-be rescuers with skills to safely achieve the purpose of their heroic acts is a commendable goal. Further studies on real rather than perceived levels of rescue competency are needed to refute or support speculation that males overestimate their ability in this critical area of drowning prevention.

Closer analysis of the opinions on respondents' rescue competency and confidence at the conclusion of the water safety programme reveals interesting gender differences. While no significant differences were found in female commitment to helping someone in difficulty in the water, significantly more females than males would do an in-water rescue in a pool but not open water (females 48%, males 18%), and more felt that better swimmers should do the rescue (females 75%, males 46%). Whether these sentiments indicate gender differences in risk aversion, sense of self-preservation or lack of water and rescue competency or any combination of these factors requires further investigation.

### **Limitations**

While the results of this study provide valuable insight into the nature of bystander rescue and a programme designed to inform would-be rescuers of safe ways of helping others in trouble in the water, the findings should be treated with some caution. First, because of the cross-sectional nature of the survey, only associations rather than causality can be determined. Second, because the respondents were selected from courses aimed at parents and their children, and were conducted during the working day, females are over-represented in the study. Further studies where males are equally represented may shed further light on the gender differences observed in this study. Third, because respondents had voluntarily enrolled in the water safety programme, it is possible that their interest in water safety is not representative of all parents and their willingness to take part in the surveys introduced a biased response. Fourth, because the response rate was lower in the post-intervention survey, it is possible that the post-intervention results were potentially biased. Fifth, while differences in rescue safety knowledge were evident at the conclusion of the teaching programme, no follow-up study was undertaken at a later date to ascertain retention of that knowledge. Further studies that include retention of knowledge testing are recommended. Sixth, the survey was only available in English; those with English as a second language may have been disadvantaged in interpreting and answering the questions accurately. Finally, use of self-reported data on swimming and rescue competencies may have introduced bias that may not reflect actual competencies (Mickalide, 1997; Robertson, 1992; Watson, Kendrick, & Coupland, 2003). Further studies on real rather than perceived rescue competencies are recommended. Further studies on real rather than perceived rescue competencies in a variety of settings are recommended.

### **Conclusion**

In an aquatic environment, the risk of drowning is omnipresent and untrained bystanders are often the only resort in preventing drowning. Rescuer drowning is a persistent and tragic reflection of the risk associated with 'going to the rescue'. This study, with its focus on improving understanding of safe rescue techniques through the *4Rs of Aquatic Rescue* education programme, has shown increased understanding of rescuer safety among participants. The evidence suggests that the *4Rs of Aquatic Rescue* programme has provided sound safety knowledge upon which to base future education and safety promotion in emergency rescue activity. Its application in a family-oriented water safety programme appears particularly appropriate. In addition, the study has created a profile of would-be rescuers by exploring their formative training (and lack of it), and the attitudes that underpin their

perceptions of bystander rescue. Gaps exposed in would-be rescuers' knowledge of safe rescue techniques and misconceptions about their ability to cope with an emergency drowning incident suggest that ongoing promotion of education in safe bystander rescue technique is a worthy goal. A linked study to see what changes are made at an individual level to address the causation issue is recommended. To facilitate greater reach in the future, it is recommended that the programme be incorporated into train-the-trainer delivery models for those likely to be first responders to a drowning incident. The loss of life through rescuer drowning is preventable, and too great a threat to be left to altruism and chance.

### Disclosure statement

No potential conflict of interest was reported by the authors.

### References

- Auckland Council. (2014). *Auckland profile – initial results from the 2013 Census*. Social and Economic Research Team. Auckland: Author. Retrieved from <http://www.aucklandcouncil.govt.nz/EN/planspoliciesprojects/reports/Documents/aucklandprofileinitialresults2013census201405.pdf>
- Woman drowns trying to save partner. (2014, February 15). Bay of Plenty Times. Retrieved from [http://www.nzherald.co.nz/bay-of-plenty-times/news/article.cfm?c\\_id=1503343&objectid=11203152](http://www.nzherald.co.nz/bay-of-plenty-times/news/article.cfm?c_id=1503343&objectid=11203152)
- Department of Education. (1987). *Physical education: A guide for success*. Wellington: Author.
- Franklin, R.C., King, J., & Leggat, P. (2015). Who rescues who: A Queensland, Australia investigation. In J. Scarr (Ed.), *Proceedings of the world conference on drowning prevention* (pp. 35). Penang: International Life Saving Federation.
- Franklin, R.C., & Pearn, J.H. (2010). The rescuer who drowns. *Injury Prevention, 16*, A81. doi:10.1136/ip.2010.029215.294
- Franklin, R.C., & Pearn, J.H. (2011). Drowning for love. The aquatic-victim-instead-of-rescuer (AVIR) syndrome: Drowning fatalities involving those attempting to rescue a child. *Journal of Paediatrics and Child Health, 47*(1–2), 44–47. doi:10.1111/j.1440-1754.2010.01889.x
- Gulliver, P., & Begg, D. (2005). Usual water-related behaviour and 'near-drowning' incidents in young adults. *Australian and New Zealand Journal of Public Health, 29*(3), 238–243. doi:10.1111/j.1467-842X.2005.tb00761.x
- Howland, J., Hingson, R., Mangione, T.W., Bell, N., & Bak, S. (1996). Why are most drowning victims men? Sex differences in aquatic skills and behaviors. *American Journal of Public Health, 86*, 93–96. doi:10.2105/AJPH.86.1.93
- Lin, C-Y., Wang, Y-F., Lu, T-H., & Kawach, I. (2014). Unintentional drowning mortality by age and body of water: An analysis of 60 countries. *Injury Prevention, 21*(E1), E43–E50. doi:10.1136/injuryprev-2013-041110
- McCool, J.P., Moran, K., Ameratunga, S., & Robinson, E. (2008). New Zealand beachgoers swimming behaviors, swimming abilities and perception of drowning risk. *International Journal of Aquatic Research and Education, 2*(1), 7–15.
- Mickalide, A. (1997). Threats to measurement validity in self-reported data can be overcome. *Injury Prevention, 3*, 7–8. doi:10.1136/ip.3.1.7
- Moran, K. (2006). Water safety knowledge, attitudes and behaviours of Asian youth in New Zealand. In S. Tse, M.E. Hoque, K. Rasanathan, M. Chatterji, R. Wee, S. Garg, & Y. Ratnasabapathy (Eds.), *Prevention, protection and promotion. Proceedings of the second international Asian health and wellbeing conference* (pp. 13–14). Auckland: University of Auckland.
- Moran, K. (2007). Water safety knowledge, attitudes and behaviours of young Pasifika New Zealanders. *New Zealand Journal of Educational Studies, 42*(1–2), 161–169.
- Moran, K. (2008a). Will they sink or swim? New Zealand youth water safety knowledge and skills. *International Journal of Aquatic Research and Education, 2*(2), 114–127.
- Moran, K. (2008b). Rock fishers' practice and perception of water safety. *International Journal of Aquatic Research and Education, 2*(2), 128–139.
- Moran, K. (2009). Parent/caregiver perceptions and practice of water safety at the beach. *International Journal of Injury Control and Safety Promotion, 16*(4), 215–221. doi:10.1080/17457300903307045
- Moran, K., & Stanley, T. (2013). Readiness to rescue: Bystander perceptions of their capacity to respond in a drowning emergency. *International Journal of Aquatic Research and Education, 7*(4), 290–300.
- Moran, K., & Willcox, S. (2013). Water safety practices and perceptions of 'new' New Zealanders. *International Journal of Aquatic Research and Education, 7*(2), 136–146.
- Four words to avoid tragedy. (2013, December 6). *New Zealand Herald*, p. A35. Retrieved from [http://www.nzherald.co.nz/nz/news/article.cfm?c\\_id=1&objectid=11167656](http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11167656)
- Summer drowning toll rises to 35. (2014, March 31). *New Zealand Herald*, p. A35. Retrieved from [http://www.nzherald.co.nz/nz/news/article.cfm?c\\_id=1&objectid=11229665](http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11229665)
- Pearn, J., & Franklin, R.C. (2009). "Flinging the Squaler" life-line. Rescues for drowning prevention. *International Journal of Aquatic Research and Education, 3*(3), 315–321.
- Pearn, J.H., & Franklin, R.C. (2012). The impulse to rescue: Rescue altruism and the challenge of saving the rescuer. *International Journal of Aquatic Research and Education, 6*(4), 325–335.
- Robertson, L.S. (1992). The validity of self-reported behavioural risk factors. *The Journal of Trauma, 32*, 58–59. doi:10.1097/00005373-199201000-00012
- Royal Life Saving Society Canada. (1972). *Canadian lifesaving manual*. Toronto: RLSC.
- Royal Life Saving Society Australia. (2006). Non-swimming rescues. In RLSSA (Ed.), *Swimming & lifesaving: Water safety for all Australians* (5th ed., pp. 86–91). Sydney: Elsevier/Mosby.
- Royal Life Saving Society Australia. (2012). *Swimming & lifesaving: Water safety for all Australians* (6th ed.). Sydney: Elsevier/Mosby.
- Stanley, T., & Moran, K. (in press). Parental perceptions of water competence and drowning risk for themselves and their children in an open water environment. *International Journal of Aquatic Research and Education*.
- Would-be rescuers losing their lives. (2014, January 5). *Sunday Star Times*, p. A12. Retrieved from <http://www.stuff.co.nz/national/9574440/Would-be-rescuers-losing-their-lives>
- Szpilman, D., Webber, J., Quan, L., Bierens, J., Morizot-Leitee, L., Langendorfer, S.J., Beerman, S., & Løfgren, B. (2014). Creating a drowning chain of survival. *Resuscitation, 85*, 1149–1152.
- Turgut, A., & Turgut, T. (2012). A study on rescuer drowning and multiple drowning incidents. *Journal of Safety Research, 43*(2), 129–132. doi:10.1016/j.jsr.2012.05.001

- Venema, A.M., Groothoff, J.W., & Bierens, J.J.L.M. (2010). The role of bystanders during rescue and resuscitation of drowning victims. *Resuscitation*, *81*, 434–439. doi:10.1016/j.resuscitation.2010.01.005
- WaterSafe Auckland Inc. (2015a). Is someone in trouble in the water? [Pamphlet] Retrieved from [http://www.watersafe.org.nz/wp-content/uploads/2015/10/WAI-4Rs-flyer-\\_Aug15-FINAL.pdf](http://www.watersafe.org.nz/wp-content/uploads/2015/10/WAI-4Rs-flyer-_Aug15-FINAL.pdf)
- WaterSafe Auckland Inc. (2015b). Is someone in trouble in the water? Do the 4Rs. [Video clip] Retrieved from <https://www.youtube.com/watch?v=jErHPDd1Ji0>
- Water Safety New Zealand. (2014). *Drownings within New Zealand – rescuing others, 1980-YTD (4<sup>th</sup> March, 2014)*. Statistical request from Drownbase™. Wellington: Author.
- Watson, M., Kendrick, D., & Coupland, C. (2003). Validation of a home safety questionnaire used in a randomized control trial. *Injury Prevention*, *9*, 180–183. doi:10.1136/ip.9.2.180
- World Health Organization. (2014). *Global Report on drowning. Preventing a leading killer*. Geneva: Author.